51. (New) The system defined in Claim 39 wherein the reversible Two/Ten variable wavelet filter performs an overlapped reversible wavelet transform is an efficient reversible transform in that its determinant is equal to 1.

52. (New) The decoding system defined in Claim 42 wherein the overlapped reversible wavelet transform is an efficient reversible transform in that its determinant is equal to 1.

REMARKS

Applicant respectfully requests reconsideration of this application as amended. Claims 1-43 are pending in the application. Claims 1, 6-8, 12, 13, 16, 17, and 33-36 have been amended. Claims 44-52 have been added. No claims have been canceled.

The Examiner rejected Claims 1, 4-8, 12-13 and 15-38 under 35 U.S.C. §103 as being unpatentable over Shapiro, "Embedded Image Coding Using Zero Trees of Wavelet Coefficients" in view of Woods, "Subband Image Coding", and Ormsby, et al. The present invention as claimed in Claim 1 requires an overlapped reversible wavelet transform be applied to input data. The reversible transform comprises the implementation of an exact reconstruction system in integer arithmetic. This enables a signal with integer coefficients to be lossly covered. Neither Shapiro, Woods nor Ormsby sets forth an overlapped reversible wavelet transform. Therefore, their combination cannot render the present invention obvious.

The Examiner states that Shapiro can use various different conventional well known filters of Woods since they both provide for quadrature mirror filters (QMFs) filters. However, the fact that a transform is implemented as a quadrature mirror filter does not make it reversible. The Examiner also discusses where the number of taps correspond to the length of filters in that a QMF may consist of one pair of filters with various different filter lengths. However, varying the number of taps in itself does not result in a reversible wavelet transform. Certain rounding is required to obtain an overlapped reversible wavelet transform and Shapiro does not teach such rounding.

Furthermore, it appears the Examiner may be confusing perfect reconstruction with reversibility. Perfect reconstruction is a property that applies when using infinite precision floating point numbers. However, infinite precision floating point numbers are not available in practical applications. Shapiro can not obtain perfect reconstruction (although he attempts to do so). On the other hand, the present invention as claimed sets forth a reversible wavelet transform. Such reversibility does not involve the use of infinite precision floating point numbers, but instead deals with integers. In view of the above, Applicant respectfully submits that the combination of Shapiro, Woods and Ormsby does not set forth a reversible transform and, therefore, the combination cannot render the present invention as claimed obvious.

Moreover, Claim 1 sets forth that the context modeling of bits of coefficients generated by the overlapped reversible wavelet transform is based

on known coefficients and other frequency band and neighboring coefficients in the same frequency band. It is unclear how the applicant believes that it is permissible to combine Ormsby with Shapiro. From the comments in the Office Action, it appears that although the Examiner admits that Shapiro does not explicitly provide for context modeling bits of coefficients based on known coefficients and other frequency bands and neighboring coefficients in the same frequency band, that this is conventional and well known as provided by Ormsby. However, the Examiner fails to see why one skilled in the art confronted with the same problem as that with the present invention would look to Shapiro and Ormsby and combine the two. The Examiner appears to be arguing that the motivation to combine the Shapiro and Ormsby references stems from the fact that both show arithmetic coders and that because Ormsby shows an improvement, one of ordinary skill in the art would be motivated to include Ormsby's arithmetic coder in the Shapiro system. Applicant respectfully disagrees.

The test is whether the Shapiro reference shows a motivation or suggestion to combine with the teaching in Ormsby. The fact that they both reference the same article and that Ormsby is an improvement to what is described in that article means little when the fact is that Shapiro's citing that reference as for arithmetic coding and the context modeling of bits is not arithmetic coding. Moreover, Shapiro is not using neighboring coefficients in the same frequency band for context modeling. On the other hand, Shapiro provides

for neighboring coefficients for coding of symbols. That is, the symbols referred to by the Examiner are the symbols that are to be coded and not data bits of coefficients used to select a context that would be associated with the probability estimation that would be used to code bits (as used in the present invention).

Any improvement Ormsby makes with respect to the classic arithmetic coding is used solely in setting forth a system that may be used with the vector quantization codebook and a lapped orthogonal transform (LOT), neither of which are mentioned in the Shapiro reference. Therefore, Applicant respectfully submits that one skilled in the art would not combine the teachings of Ormsby with that of Shapiro. It appears the Examiner is doing no more than using hindsight to select different items from a variety of references in an attempt to create a combination. This is clearly not permissible. In view of this, Applicant respectfully submits the present invention as claimed is not obvious in view of the combination of Shapiro, Woods and Ormsby.

The Examiner rejected Claims 39-40 and 42 under 35 U.S.C. §103 as being unpatentable over Shapiro in view of Woods. Applicant respectfully submits that the reversible 2,10 wavelet transform is not shown in either of the references and is not considered a filter that is conventional and specifically the fact. No filter in Shapiro or Woods is a reversible 2,10 variable wavelet filter. Therefore, Applicant respectfully submits that the present invention as claimed in Claims 39-40 and 42 is not obvious in view of Shapiro and Woods.

The Examiner rejected Claim 41 and 43 under 35 U.S.C. §103 as being unpatentable over Shapiro, Woods and Ormsby. For the same reasons as given above with respect to Claims 39-40 and 42, the present invention as claimed is not obvious in view of Shapiro, Woods and Ormsby.

The Examiner also rejected Claims 25-31 under 35 U.S.C. §103 as being unpatentable over Shapiro, Woods, Ormsby and further in view of Hartung, et al. or Shinichi. Applicant respectfully submits that neither Hartung nor Shinichi sets forth a reversible 2,10-transform. In view of this, Applicant submits that the present invention is not obvious in view of the cited combination for the same reasons set forth above.

Examiner rejected Claims 39-40 and 42 under 35 U.S.C. §103 as being unpatentable over Shapiro in view of Woods or in the alternative in view of Woods, and further in view of Hartung, et al. or Shinichi. Applicant respectfully submits that the present invention as claimed is not obvious in view of the combination of either of the cited combinations for the same reasons set forth above.

The Examiner rejected Claims 41 and 43 under 35 U.S.C. §103 as being unpatentable over Shapiro, in view of Woods and either Hartung or Shinichi and further in view of Ormsby. Applicant respectfully submits the present invention as claimed sets forth reversible wavelet transforms. These are not disclosed in these references. Therefore, Applicant respectfully submits that the present invention is not obvious in view of the cited combination.

Accordingly, Applicant respectfully submits that the rejections under 35 U.S.C. §103(a) have been overcome by the amendments and the remarks and withdrawal of these rejections is respectfully requested. Applicant submits that Claims 1, 6-8, 12, 13, 16, 17 and 33-36 as amended and Claims 44-52 as added are now in condition for allowance and such action is earnestly solicited.

Please charge any shortages and credit any overcharges to our Deposit Account No. 02-2666.

Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: September 13, 2000

Michael J. Mallie
Attorney for Applicant
Registration No. 36,591

12400 Wilshire Boulevard
Seventh Floor
Los Angeles, CA 90025-1026
(408) 720-8598

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231 on September 13, 2000

Mara E. Brown — September 13, 2000 Date